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10/526577
DTOS R.2 CT/PTO 04 MAR 2005

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Patentanmeldung Nr. Patent application No. Demande de brevet n°

02078706.5

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

R C van Dijk

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Anmeldung Nr.:
Application no.: 02078706.5
Demande no:

Anmeldetag:
Date of filing: 09.09.02
Date de dépôt:

Anmelder/Applicant(s)/Demandeur(s):

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Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se référer à la description.)

orally administrable composition for improving hair and coat quality

In Anspruch genommene Priorität(en) / Priority(ies) claimed / Priorité(s)
revendiquée(s)

Staat/Tag/Aktenzeichen/State/Date/File no./Pays/Date/Numéro de dépôt:

Internationale Patentklassifikation/International Patent Classification/
Classification internationale des brevets:

A61K7/00

Am Anmeldetag benannte Vertragstaaten/Contracting states designated at date of
filing/Etats contractants désignées lors du dépôt:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LU MC NL PT SE SK TR

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Orally administrable composition for improving hair and coat quality

5 The present invention pertains to a method for improving hair or coat quality in humans or animals. It also relates to a method for stimulating hair growth. The present invention further relates to orally administrable compositions for improving coat or hair quality and growth.

Background of the Invention

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In recent years, there has been a progressive increase in the damage to hair or coat. Indeed, the hair perpetually undergoes a variety of stresses from the outside. That is, the hair is subjected to not only natural stresses such as ultraviolet rays from the sun, air pollution and dirt but also even more stringent stresses such as shampooing, brushing, heat from a drier, and beauty treatments such as hair-dyeing and bleaching. As a result, well-known problems of the hair are caused, including dry and rough hair, increased number of split ends, broken hair, falling hair, and reduced strength of hair fibers.

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Therefore, in order to prevent or mitigate the above-described damage to the hair, various attempts have been proposed from different approaches.

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Various cosmetic compositions for hair, including shampoo, hair rinse, hair treatment and the like are known. For example, the patent publication JP-A-63-105000 discloses various cosmetic compositions for hair containing an acylated peptide. US 6,251,379 provides a hair-cosmetic composition containing keratose which is cationized with a quaternary ammonium salt, and a silicone derivative. Cationic surfactants are also frequently used for imparting smoothness to hair fibers. However, the gloss imparted thereby is not fully satisfactory, and besides, incorporation of cationic surfactants in large amounts is unfavorable in terms of safety.

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Others attempts have been made through orally administrable compositions. For example, US 5,250,300 discloses a liquid internal medicine for domestic animals which contains only an extract from stems of natural Stevia plants. It is intended for improving the physical constitution of domestic animals to further result in improvement of meat quality, milk quality and hair gloss of domestic animals.

Also, it is known that nutritional interventions may impact hair conditions, such as in WO 9856263 which discloses the combination of linoleic acid and zinc for the improvement of skin quality and coat condition in pets.

However, there is still a need in the art to provide an effective nutritional way to improve hair or coat quality, particularly shininess and hair growth in humans and animals.

Summary of the invention

For this purpose, the present invention provides an orally administrable composition for improving hair or coat quality, which comprises as an active ingredient an effective amount of a molecule that stimulates energy metabolism of the cell, an antioxidant or combinatory admixtures thereof, in an orally acceptable carrier

Such a composition further improves hair growth in humans or animals.

Indeed, it has been surprisingly found that some molecules that stimulate energy metabolism such as carnitine, and also antioxidants, e.g. ginkgo extracts can improve hair and coat quality and condition.

The composition may be a complete and nutritionally balanced food for humans or animals. It can also be a dietary supplement, a pharmaceutical or veterinary composition, for example,

The composition according to the present invention can provide multiple benefits by increasing hair thickness and glossiness, improving hair composition and structure, modifying of sebum production or composition.

5 In another aspect, this invention relates to the use of an effective amount of a molecule that stimulates energy metabolism of the cell, an antioxidant or combinatory admixtures thereof, for the preparation of a composition intended to improve hair or coat quality in humans or animals.

10 In a further aspect, this invention provides a method to improve hair or coat quality in humans or animals, comprising administering to the individual, an orally administrable composition as described above.

Detailed Description of the Invention

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According to a first aspect, an orally administrable composition for improving hair or coat quality, which comprises as an active ingredient an effective amount of a molecule that stimulates energy metabolism of the cell, an antioxidant or combinatory admixtures thereof, in an orally acceptable carrier, is concerned.

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The molecule that stimulates energy metabolism of the cell may be L-carnitine, creatine, fatty acids (mono or polyunsaturated fatty acids, particularly omega-3 fatty acids), cardiolipin, nicotinamide, carbohydrate and natural sources thereof, for example.

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Preferably, the amount of said molecule is of at least 1mg per kg of body weight per day, more preferably from 1mg to 1 g per kg of body weight per day.

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The antioxidants are compounds that decrease protein oxidation (e.g. prevent formation of protein carbonyls). They may be sources of thiols (e.g. Lipoic acid, cysteine, cystine, methionine, S-adenosyl-methionine, taurine, glutathione and natural sources thereof), or compounds that upregulate their biosynthesis in vivo, for

example. The antioxidant according to the invention may also be other antioxidants such as vitamin C, vitamin E (tocopherols and tocotrienols), carotenoids (carotenes, lycopene, lutein, zeaxanthine..) ubiquinones (e.g. CoQ10), tea catechins (e.g. epigallocatechin gallate), coffee extracts containing polyphenols and/or diterpenes (e.g. kawheol and cafestol), ginkgo biloba extracts, grape or grape seed extracts rich in proanthocyanidins, spice extracts (e.g. rosemary), soy extracts containing isoflavones and related phytoestrogens and other sources of flavonoids with antioxidant activity, compounds that upregulate cell antioxidant defense (e.g. ursodeoxycholic acid for increased glutathione S-transferase, ursolic acid for increased catalase, ginseng and ginsenosides for increase superoxide dismutase and natural sources thereof i.e. herbal medicines), for example.

Preferably, the amount of the antioxidant is of at least 0.025 mg per kg of body weight per day, more preferably from 0.025 mg to 250mg per kg of body weight per day.

The carrier may be any food or pharmaceutical product, or a nutritional supplement or a composition for oral administration. Examples for food or pharmaceuticals carriers are milk, yoghurt, curd, cheese, fermented milks, milk based fermented products, ice-creams, fermented cereal based products, milk based powders, infant formulae or tablets, liquid suspensions, dried oral supplement, wet oral supplement, dry-tube-feeding, pet food products. The composition for oral administration may be in capsules, soft capsules, tablets, pastes or pastilles, gums, or drinkable solutions or emulsions. Methods for preparing the carrier are common knowledge.

The composition according to the invention may also comprise usual excipients, in particular sweeteners, flavouring agents or preservatives. It can further comprise a prebiotic and/or a probiotic micro-organism.

The compositions of the invention may be formulated according to any one of a number of techniques that are well known to this art.

In one embodiment, a pharmaceutical composition containing at least one of the objective substances in an amount sufficient to achieve the desired effect in an individual can be prepared. This composition may be a tablet, a liquid, a dried oral supplement, a wet oral supplement, dry tube-feeding, wet tube-feeding etc.. The pharmaceutical composition will further contain carriers and excipients that are suitable for delivering the respective active molecule of different nature to the target tissue. The kind of the carrier/excipient and the amount thereof will depend on the nature of the substance and the mode of drug delivery and/or administration contemplated. It will be appreciated that the skilled person will, based on his own knowledge select the appropriate components and galenic form to target the active compound to the skin.

In another embodiment, a food composition for human consumption is prepared. This composition may be a nutritional complete formula, a dairy product, a chilled or shelf stable beverage, soup, a dietary supplement, a meal replacement, and a nutritional bar or a confectionery.

The nutritional formula is preferably enterally administrable; for example in the form of a powder, a liquid concentrate, or a ready-to-drink beverage. If it is desired to produce a powdered nutritional formula, the homogenised mixture is transferred to a suitable drying apparatus such as a spray drier or freeze drier and converted to powder.

In another embodiment, a usual food product may be enriched with the combination according to the present invention. For example, a fermented milk, a yoghurt, a fresh cheese, a renneted milk, a confectionery bar, breakfast cereal flakes or bars, drinks, milk powders, soy-based products, non-milk fermented products or nutritional supplements for clinical nutrition. Then, the amount of the molecule that stimulates energy metabolism is preferably of at least 50 ppm by weight and the antioxidant is preferably of at least 10 ppm by weight.

In a further embodiment, pet food products may be prepared. The petfood formulation is preferably a complete and nutritionally balanced pet food. It can also be a dietary supplement for pets or in the form of a pharmaceutical composition. The nutritionally complete pet food formulation according to the invention may be in any
5 suitable form, for example a powder, a dried kibble, or pellet or other dried form, extruded form, semi-moist or wet form, such as a chunk or loaf or pudding. It may be chilled or provided as a shelf stable product. This pet food may be produced by conventional methods.

10 In another embodiment, dietary adjuncts may be prepared so as to improve pet food quality. As dietary adjuncts, they may be encapsulated or may be provided in powder form and packaged in conjunction with or separately from a main meal, be it wet or dry. By way of example, a powder containing selected substances according to the invention, may be packed in sachets in a powder form or in a gel or
15 lipid or other suitable carrier. These separately packaged units may be provided together with a main meal or in multi-unit packs for use with a main meal or treat, according to user instructions.

The food composition according to the present invention aims to increase hair
20 thickness and glossiness, improve hair composition and structure, modify sebum production or composition.

According to another aspect, this invention relates to the use of an effective amount of a molecule that stimulates energy metabolism of the cell, an antioxidant or
25 combinatory admixtures thereof, for the preparation of a composition intended to improve hair or coat quality in humans or animals.

According to a last aspect, this invention provides a method to improve coat or hair quality in humans or animals, comprising administering to the individual, a
30 composition as described above.

The said composition may be administered to the individual as a supplement to the normal diet or as a component of a nutritionally complete food. It is preferred to prepare a nutritionally complete food as described above.

5 Preferably, the amount of the composition to be consumed by the individual to obtain a beneficial effect will depend upon its size, its type, and its age. However an amount of carnitine of at least 1mg per kg of body weight per day and an amount of the antioxidant of at least 0.025 mg per kg of body weight per day, would usually be adequate.

10

The following examples are given by way of illustration only and in no way should be construed as limiting the subject matter of the present application. All percentages are given by weight unless otherwise indicated.

15

Examples

Example 1: In-vivo trials on the effect of dietary nutrients according to the present invention

20

- **Study design:**

Dietary intervention was of 3 (short) or 15 months (long), all animal groups were fed Ad libitum. In a first experiment, mice of 12 months of age were randomised in 5 groups of 12 mice each and fed for 3 months either diet A, C, D, E or F. In a second study 3 month old mice were randomized in groups of 30 mice each and fed diet A or D for 15 months. Animal weight was measured once a week.

25

- **Animals:**

Male mice C57/BL6 were obtained from Iffa credo (France) at 9 weeks of age. After 3 weeks adaptation, mice (12 weeks old) were housed individually and fed the control diet until the nutritional intervention. Mice had free access to food and water during the whole study and were submitted to 12 hours light and dark cycles.

30

- **Diets:**

The control diet (diet A) composed of 18% proteins (soy and whey), 11% fat (soybean oil), 59% carbohydrates (starch + sucrose) and 10% cellulose was supplemented with either ginkgo biloba extract (diet E), L-carnitine (diet F), antioxidants or carnitine and antioxidants. These diets are as follows:

Diet A - Control : 18% proteins (soy and whey), 11% fat, 59% carbohydrates, and 5% cellulose.

Diet C - Cocktail of antioxidants: Diet A + 0.19% vit C, 0.03% vit E, 0.075% grape seed extract, 0.4% cysteine.

Diet D: Diet A + 0.3% L- carnitine + cocktail of antioxidants of diet C.

Diet E: Diet A + 0.0375% Ginkgo biloba extract (Linnea)

Diet F: Diet A + 0.3% L- carnitine

- **Coat gloss determination:**

Coat gloss was determined by reflectometry using a portable Spectrophotometer "Macbeth, Colour-eye XTH" (GretagMacbeth GmbH, Fraunhoferstrasse 14 D-82152 Martinsried, Munich) equipped with a CIE (Commission Internationale de l'Eclairage) standard daylight illumination source D65, a 10 mm circular diameter of view (RAV) and with Specular Component Excluded (SCE) (this measurement excludes the specular component and correlates well with visual evaluation of an object's surface (colour and appearance)). Coat gloss was measured on live animal on the lowest part of the back near the tail. Three measurements were done per animal.

Results

Short term supplementation: Mice coat gloss evaluation was done at the beginning and after 10 weeks of dietary supplementation. The results are showed in table 1.

Diet	Coat Gloss at t_0	Coat Gloss after 10 Week	P-value
Control group (A)	0.92	0.37	0.004
Ginkgo (E)	0.59	0.56	0.79

Carnitine (F)	0.75	0.69	0.43
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Table 1.

5 A significant decrease in coat gloss was measured after 10 weeks for the control group (A) while no significant changes in coat gloss was measured for the ginkgo and carnitine groups.

Long term supplementation; Mice coat gloss evaluation was done after 15 months of supplementation (mice of 18 months of age). The results are showed in table 2.

	Coat Gloss
Control (A)	0.515
Carnitine + Antioxidant (D)	0.830

Table2

10 The analysis of variance ANOVA is used to test the significance of the difference between treatments at 95% of confidence. Source of Variation between Groups A & D: P-value of 0.00012. These two groups are significantly different. The group "Carnitine + Antioxidant" (D) has a more glossy coat after 15 months of supplementation when compared to the control group (A).

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Example 3: Dry pet food

20 A feed mixture is made up of about 58% by weight of corn, about 5.5% by weight of corn gluten, about 22% by weight of chicken meal, 2,5% dried chicory, 1% carnitine, 0.1% Vit C, vit E (150 IU / kg), 0.05%grape seed proanthocyanidin extract

Example 2: Dry pet food

25 A feed mixture is made up of about 58% by weight of corn, about 5.5% by weight of corn gluten, about 22% by weight of chicken meal, 2,5% dried chicory, 0.1% carnitine, 0.1% Vit C, vit E (150 IU / kg), 0.05% grape seed proanthocyanidin extract and 0.4% cysteine as antioxidant, salts, vitamins and minerals making up the remainder. The fed mixture is fed into a preconditioner and moistened. The moistened feed is then fed into an extruder-cooker and gelatinised. The gelatinised

matrix leaving the extruder is forced through a die and extruded. The extrudate is cut into pieces suitable for feeding to dogs, dried at about 110°C for about 20 minutes, and cooled to form pellets.

5 This dry dog food is able to improve coat quality in dogs, particularly coat gloss.

Example 3: Dry pet food

10 A feed mixture is prepared as in example 1, using 0.2% carnitine and 0.05% ginkgo biloba extract as antioxidant. Then, the feed mixture is processed as in example 1. The dry dog food is particularly intended to improve or restore the age-related skin alterations in dogs.

Example 4: Nutritional formula

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A nutritional composition is prepared, and which contains for 100 g of powder: 15 % of protein hydrolysate, 25 % of fats, 55 % carbohydrates (including maltodextrin 37 %, starch 6 %, sucrose 12 %), traces of vitamins and oligoelements to meet daily requirements, 2 % minerals and 3 % moisture and 2% pyruvate and 1% 20 carnosine or carnosine precursor as antioxidant.

13 g of this powder is mixed in 100 ml of water. The obtained formula is particularly intended for improving hair growth and hair quality, in particular shininess.

Claims

1. An orally administrable composition for improving hair or coat quality in humans or animals, which comprises as an active ingredient an effective amount of a molecule that stimulates energy metabolism of the cell or an antioxidant or combinatory admixtures thereof, in an orally acceptable carrier.
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2. A composition according to claim 1, wherein said molecule is L-carnitine, creatine, fatty acids (monounsaturated and polyunsaturated, particularly omega-3 fatty acids), cardiolipin, nicotinamide or carbohydrate and natural sources thereof.
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3. A composition according to claim 1 or 2, in which the antioxidant is a source of thiols such as lipoic acid, cysteine, cystine, methionine, S-adenosyl-methionine, taurine, glutathione or natural sources thereof, or a compound that upregulate their biosynthesis in vivo, or other antioxidants such as vitamin C, vitamin E, carotenoids, ubiquinones, tea catechins, coffee extracts containing polyphenols and/or diterpenes, grape or grape seed extracts rich in proanthocyanidins, spice extracts, soy extracts and other sources of flavonoids with antioxidant activity or compounds such as ursodeoxycholic acid, ursolic acid, ginseng and gingenosides and natural sources thereof.
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20
4. A composition according to any of claims 1 to 3, which is a pharmaceutical composition, a nutritionally complete pet food or a dietary supplement for animal consumption.
25
5. A composition according to any of claims 1 to 3, which is a pharmaceutical composition, a nutritionally complete human food, or a dietary supplement for human consumption.
- 30 6. A composition according to any of claims 1 to 5, which stimulates hair growth.

7. A composition according to one of claims 1 to 6, which comprises carnitine or ginkgo extract or an antioxidant or combinatory admixtures thereof.
- 5 8. Use of a molecule that stimulates energy metabolism of the cell, an antioxidant or a combination thereof, for the preparation of an orally administrable composition intended to improve hair or coat quality in humans or animals.
- 10 9. Use of a molecule that stimulates energy metabolism of the cell or an antioxidant or a combination thereof, for the preparation of an orally administrable composition intended to stimulate hair growth in humans or animals.
10. A method to improve hair or coat quality of humans or animals, comprising administering to the individual a composition according to one of claims 1 to 7.
- 15 11. A method to stimulate hair growth in humans or animals, comprising administering to the individual a composition according to one of claims 1 to 7.

Abstract**Orally administrable composition for improving hair or coat quality**

- 5 The present invention relates to an orally administrable composition for improving hair or coat quality, which comprises as an active ingredient an effective amount of a molecule that stimulates energy metabolism of the cell or an antioxidant or combinatory admixtures thereof, in an orally acceptable carrier.

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